Mutant Algal Hydrogenases

Hydrogen is the simplest and most abundant element in the world. Hydrogen (H_2) can be produced from a wide variety of domestic resources using a number of different technologies. NREL has developed an exciting new technology that produces hydrogen from a renewable resource. Mutant algal hydrogenases is a new technology that produces hydrogen from renewable resources, the sun, and green algae. NREL researchers are making great advancements in developing this new technology that has great market potential and significant advantages over other photobiological systems. The advantages are high theoretical efficiencies, as well as an inexpensive hydrogen source, water.

Overall mutant algal hydrogenases have achieved excellent results and demonstrate high market value through the use of inexpensive and abundant materials to produce hydrogen. However, currently there are performance limitations that research is focusing on improving such as algal H_2 photoproduction is sensitive to O_2, a co-product of photosynthesis. NREL is investigating ways to surmount this by focusing on genetically engineering the reversible [Fe]-hydrogenase (the enzyme that releases H_2 gas). Previous studies indicate that site directed mutagenesis could be used to decrease the O_2 sensitivity of the hydrogenase and thus eventually lead to a system that produces H_2 under aerobic conditions, in the presence of oxygen.

Overall this new innovative technology provides an opportunity for a strategic partner to further develop and decrease the time to market for this technology. This new innovative technology provides a strategic partner the opportunity to be the *first-in-line* to secure an inexpensive, easy to produce renewable energy resource that has the potential to play a major role in the Hydrogen Economy.

For more information on NREL technology and hydrogen production from algae:
http://www.eere.energy.gov/hydrogenandfuelcells/hydrogen/pdfs/42_nrel_maria_ghirardi.pdf

http://www.eere.energy.gov/hydrogenandfuelcells/pdfs/32405a3.pdf

http://www.ct.ornl.gov/symposium/22nd/index_files/poster01.17.htm

http://www.ases.org/hydrogen_forum03/OverendF.pdf

Licensing Our Technology
NREL has several pieces of intellectual property in this area and is looking for a strategic alliance to develop and commercialize this technology. The alliance could be a license, a Cooperative Research and Development Agreement (CRADA), or a Work For Others (WFO) that leverages NREL's unique capabilities, facilities, and personnel.

Contact Information
If you would like to explore collaborative opportunities with the National Renewable Energy Laboratory please contact Richard Bolin, 303-275-3028 or at Richard_bolin@nrel.gov.

Also for more technology transfer opportunities visit our Web site at www.nrel.gov/technologytransfer.